DP-310112

CLAIMS

What is claimed is:

1. A power supply, comprising:

a solid oxide fuel cell system for providing a first source of power, said solid oxide fuel cell system also producing heat waste;

a thermionic device for providing a second source of power, said thermionic device providing said second source of power from said heat waste which is provided to said thermionic device; and

wherein said heat waste is in fluid communication with a heat exchanger of said thermionic device.

2. The power supply as in claim 1, further comprising:

an exhaust conduit providing fluid communication between an exhaust of said fuel cell system and a heat exchanger of said thermionic device.

3. The power supply as in claim 1, wherein said heat waste is generated by said solid oxide fuel cell system before, during, and after said solid oxide fuel cell is providing said first source of power.

4. The power supply as in claim 1, wherein said heat exchanger is configured to provide heat to a cathode of said thermionic device.

5. The power supply as in claim 4, wherein said cathode is located in a housing of said thermionic device and said cathode is separated from an anode of said thermionic device, wherein said heat causes electrons to separate from said cathode.

6. The power supply as in claim 5, wherein a vacuum is disposed between said anode and said cathode.

7. The power supply as in claim 4, wherein said thermionic device is configured to provide power when a heat source of approximately 700 degrees Celsius is provided to said cathode.

8. The power supply as in claim 7, wherein said power supply is configured for use in a vehicle.

9. The power supply as in claim 7, further comprising a power conditioner for receiving and conditioning power generated by said fuel cell system and said thermionic device.

10. The power supply as in claim 1, wherein said fuel cell system comprises a plurality of fuel cell stacks providing heat waste to a plurality of thermionic devices.

11. The power supply as in claim 1, further comprising another heat exchanger, said another heat exchanger providing an inlet and an exhaust of air to an anode of said thermionic device, wherein unheated air is supplied to said inlet and air heated by said anode is supplied to said exhaust, said anode being maintained at a temperature differential between a cathode of said thermionic device, said another heat exchanger also provides an exhaust to an inlet conduit of said fuel cell system.

12. The power supply as in claim 1, wherein said heat waste of said solid oxide fuel cell system is within a range defined by a lower limit of 400 degrees Celsius and an upper limit of 1,200 degrees Celsius when said solid oxide fuel cell system is providing said first source of power.

13. A power supply, comprising:

a solid oxide fuel cell system for providing a first source of power, said solid oxide fuel cell system producing heat waste when said solid oxide fuel cell is providing said first source of power;

a start up combustor for providing another source of heat;

an exhaust conduit providing fluid communication between an exhaust of said fuel cell system and an exhaust of said start up combustor to a first heat exchanger of a thermionic device, said thermionic device for providing a second source of power from heat received from either said start up combustor or said fuel cell system.

14. The power supply as in claim 13, wherein said heat waste of said solid oxide fuel cell system is within a range defined by a lower limit of 400 degrees Celsius and an upper limit of 1,200 degrees Celsius when said solid oxide fuel cell system is providing said first source of power.

15. The power supply as in claim 13, further comprising a second heat exchanger, said second heat exchanger providing an inlet and an exhaust of air to an anode of said thermionic device, wherein unheated air is supplied to said inlet and air heated by said anode is supplied to said exhaust, wherein said anode is maintained at a temperature differential between a cathode of said thermionic device.

16. The power supply as in claim 13, wherein said thermionic device and said start up combustor provide an initial source of power during a warm up phase of said fuel cell system.

17. The power supply as in claim 13, wherein said start up combustor is deactivated after said fuel cell system is providing power and said heat waste.

18. A method for generating power, comprising:

generating power from a thermionic device, said thermionic device generating power from heat received from a start up combustor under a first operating condition; and

generating power from a solid oxide fuel system, said solid oxide fuel system generating a heat exhaust when said solid oxide fuel system generates power, said heat exhaust being routed to said thermionic device, wherein said thermionic device generates power from heat exhaust when said heat exhaust reaches a predetermined temperature for energy conversion by said thermionic device.

19. The method as in claim 18, wherein said start up combustor is shut down when said heat exhaust reaches a predetermined temperature for energy conversion by said thermionic device.

20. The method as in claim 18, wherein said predetermined temperature is within the range defined by a lower limit of 400 degrees Celsius and an upper limit of 1,200 degrees Celsius.

21. The power supply as in claim 1, further comprising:

a means for providing fluid communication between an exhaust of said fuel cell system and a heat exchanger of said thermionic device.

22. A power supply, comprising:

a solid oxide fuel cell system for providing a first source of power, said solid oxide fuel cell system producing heat waste when said solid oxide fuel cell is providing said first source of power;

a combustor for providing another source of heat;

an exhaust conduit providing fluid communication between an exhaust of said fuel cell system and an inlet of said combustor wherein said combustor heats said exhaust of said fuel cell system to a temperature which causes a first thermionic device coupled to said combustor to provide a second source of power;

a first heat exchanger configured and positioned to cool or maintain the temperature of an anode of said first heat exchanger;

a second thermionic device configured and positioned to receive heated exhaust of said fuel cell stack, said second thermionic device providing another second source of power from heated exhaust received from said fuel cell system.

23. The power supply as in claim 22, wherein said first heat exchanger is coupled to a cooling system for cooling the anode of said first thermionic device.

24. The power supply as in claim 22, wherein said first heat exchanger is configured to receive ambient air for cooling the anode of said first thermionic device.

25. The power supply as in claim 22, wherein a second heat exchanger is configured and positioned to cool or maintain the temperature of an anode of said second thermionic device.